Topic

IB ~~Test~~ One Problems

1) A chemist decides to react 2.0 grams of VO with 5.75 grams of Fe_2O_3 to produce V_2O_5 and FeO. How many grams of V_2O_5 can be obtained?

2) A sample of the poisonous compound nicotine extracted from cigarette smoke was found to contain 74.0% by weight of carbon, 8.65% by weight of hydrogen, and 17.3% by weight of nitrogen. What is the empirical formula of nicotine?

3) An impure sample of aluminum sulfate is analyzed by forming a precipitate of insoluble barium sulfate, by reacting aluminum sulfate with an excess of barium chloride. After washing and drying, 2.000g of $BaSO_4$ was obtained. If the original sample weighed 1.000g, what was the percent of aluminum sulfate in the sample?

4) A compound with a formula M_3N contains 0.673 g of N per 1.00 gram of the metal M. What is the atomic weight of M? What element is M?

5) A chemist reacts iron(III) sulfate with barium chloride and obtains barium sulfate and iron(III) chloride. From a mixture of 50.0g of iron(III)sulfate and 100.0g of barium chloride, how much iron(III)chloride can be produced?

6) The element europium exists in nature as two isotopes: ^{151}Eu has a mass of 150.9196amu, and ^{153}Eu has a mass of 152.9209 amu. The average atomic mass of europium is 151.96 amu. Calculate the relative abundance of the two europium isotopes.

7) A compound containing only sulfur and nitrogen is 69.6% S by mass: the molecular mass is 184g/mol. What is the empirical and molecular formula for the compound?

8) Hexamehtylenediamine, $C_6H_{16}N_2$, is one of the starting materials for the production of nylon. It can be prepared from adipic acid by the following reaction:

$$C_6H_{10}O_4 + 2\ NH_3 + 4\ H_2 \longrightarrow C_6H_{16}N_2 + 4\ H_2O$$

a) What mass of Hexamehtylenediamine can be produced from 1.00×10^3 g of adipic acid.

b) What is the percent yield if 765 grams of Hexamehtylenediamine is made from 1.00×10^3 g of adipic acid?

9) Given the data below calculate the formula for the hydrate of $Al_2(SO_4)_3 \cdot X\ H_2O$.

DATA	
Mass of empty dish	28.64 g
Mass of dish with hydrated compound	47.64 g
Mass of dish with anhydrous compound	39.92g

10) A salt contains only barium and one of the halide ions. A 0.158 g sample of the salt was dissolved in water, and an excess of sulfuric acid was added to form barium sulfate($BaSO_4$) , which was filtered, dried, and weighed. Its mass was found to be 0.124 g . What is the formula of the barium halide ? (a halide ion is the ion of a halogen atom)

11) An unidentified organic compound X, containing only C, H, and O, was subjected to combustion analysis. When 228.4 mg of pure compound X was burned in excess oxygen, 627.4 mg of CO_2 and171.2 mg of H_2O were obtained. Determine the simplest formula for the compound.